

tution, Washington, D.C.; general secretary, Prof. F. E. Clements, University of Minnesota; secretary of the council, Prof. J. Zeleny, University of Minnesota.

Grants were made to the Concilium Bibliographicum Zoologicum at Zürich, and to individuals as follows:—To Prof. T. D. A. Cockerell, to assist in an investigation of the microscopic structure of the scales of different genera of fishes; to Dr. W. D. Hoyt, to assist in an investigation upon environic relations of the alga Dictyota, which develops a rhythm in fruiting coincident with every alternate springtide; to Prof. G. J. Peirce, to assist in investigations of organisms inhabiting the alternately filling and drying salt-water pools along the coasts of central California. The last two grants are to be expended under the supervision of the standing committee upon the relation of plants to climate.

THE MEAN HEIGHT OF THE ANTARCTIC CONTINENT.

PROF. W. MEINARDUS gives the results of an estimate of the mean elevation of the central core of the Antarctic land mass, based on the distribution of atmospheric pressure and consequent exchange of air between the two hemispheres, in the November and December numbers of Petermann's *Mitteilungen*. Extending Spitaler's results with the help of Mohn's discussion of the *Fram* observations, and Baschin's maps of the southern oceans, Prof. Meinardus finds that, while the mean pressure (not reduced to sea-level) is 0.85 mm. higher in January than in July between latitudes 0° to 80° N., in the zone 0° to 50° S. it is 2.14 mm. lower. In higher southern latitudes, as far as 60° S. lat., the January pressure is 0.73 mm. less than the July, and from 60° S. to the Antarctic circle the relation is almost one of equality. Hence, allowing for proportional areas, it follows that within the Antarctic circle the true atmospheric pressure must be 11 mm. higher in January than in July.

Observation, however, has so far failed to reveal the existence of this excess; the diminution of the southward temperature gradient and consequent weakening of easterly winds on the edge of Antarctica in summer render it probable that, as in the north polar region, the pressure at sea-level is actually lower in summer than in winter. The discrepancy can be explained by assuming a mean elevation for the area within the Antarctic circle, and taking -3° and -26° as the mean temperatures for January and July respectively. Prof. Meinardus gets a value for this of 1328 metres, or, as a second approximation with temperatures -6° and -29° , 1350 metres, with a probable error of ± 150 metres. Having regard to the proportion of the area known to be covered by sea, the land surface is taken as 14 millions of square kilometres (Bruce and Krümmel), and its mean height then becomes 2000 metres, with a probable error of ± 200 metres.

Recent explorations suggest that this value is not far from the truth, the covering of inland ice being, as in Greenland, an important factor. If it is approximately correct, Antarctica is the largest mass of raised land in the world; it is half as large again as Europe, and Asia, the highest of the known continents, has a mean elevation of less than half (950 metres). The accepted value of the mean height of the land surface of the world, 700 metres, is raised to 825 metres, and the mean level of the physical surface of the globe from 205 to 240 metres.

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THE NATURAL HISTORY MUSEUM.

IN NATURE of December 16 and 30 we reprinted from the *Times* some letters dealing with this subject. We were under the impression that the main point of contention was the complete separation of the Natural History Museum from the other collections in the British Museum, as recommended by the Duke of Devonshire's Royal Commission in 1874, to go no further back.

Sir Archibald Geikie has since pointed out to us that the questions put to him in the letter from the Speaker of the House of Commons to which he replied "were entirely in reference to the relations between the Trustees and the Museum," and that, this being so, we should have given a letter from Mr. Carruthers dealing with this point which had also appeared in the *Times*. We therefore now reprint the letter in question:—

Sir,—The President of the Royal Society, Sir Archibald Geikie, has expressed clearly his view on the questions in relation to the administration of the British Museum recently raised in your columns. A former eminent President, Prof. Huxley, was brought by his experience as Trustee, as Sir Archibald has been, to similar favourable conclusions.

It was notorious that Prof. Huxley severely criticised the governing body of the Natural History Departments of the British Museum. He had expressed this view to me personally, but, after he had been some time a Trustee, he spontaneously informed me that he had totally changed his opinion, and that he could not imagine a more efficient system of administration. This, I must add, was previous to 1898.

As Keeper of Botany for twenty-four years, I cannot recall a single occasion in which my department suffered from the action of the Trustees. I always found them intelligent and sympathetic in the affairs of the department.

WILLIAM CARRUTHERS.

NOTES.

THE council of the Royal Astronomical Society has awarded the gold medal of the society to Prof. F. Küstner, director of the University Observatory of Bonn, for his catalogue of stars, his pioneer determination of the aberration constant from motions in the line of sight, and his detection of the variation of latitude.

THE Geological Society of London will this year award its medals and funds as follows:—Wollaston medal, to Prof. W. B. Scott; Murchison medal, to Prof. A. P. Coleman; Lyell medal, to Dr. A. Vaughan; Wollaston fund, to Mr. E. B. Bailey; Murchison fund, to Mr. J. W. Stather; Lyell fund, to Mr. F. R. Cowper Reed and Dr. R. Broom.

PROF. R. MELDOLA, F.R.S., has been elected an honorary member of the Sociedad Española de Física y Química.

PROF. W. TRABERT has been appointed director of the k.k. Zentralanstalt für Meteorologie und Geodynamik at Vienna.

M. G. EIFFEL has been elected president of the Meteorological Society of France for 1910, and M. Teisserenc de Bort and Dr. de Valcourt vice-presidents.

THE death is announced, at the age of ninety-one years, of Dr. George Skene Keith, formerly a well-known Edinburgh physician. Dr. Keith was the author of the book "Plea for a Simpler Life," which had a wide circulation, and of other works.

By the will of the late Sir Alfred Jones, the sum of about 500,000*l.* will be at the disposal of the trustees "for

such charitable purposes and objects in England (or any British possession on the west coast of Africa) as they may in their absolute discretion think fit." For the guidance of the trustees in the administration of this very comprehensive trust, Sir Alfred Jones made the following suggestions, among others, as to purposes to which it might be applied:—(a) the technical education of natives on the west coast of Africa; (b) the advancement, benefit, or support of education or science; (c) original research of all kinds into the cause of disease on the west coast of Africa.

SIR ERNEST SHACKLETON has denied the rumour, to which reference was made in a note last week, that he is to lead this year a third expedition to the Antarctic. He discussed Antarctic exploration recently with a private party of geographical experts in Berlin, and on that occasion explained that, in the event of his going south again, he would travel polewards from the Weddell Sea or Gaussberg. The Weddell Sea was penetrated to $74^{\circ} 15' S.$ by Captain Weddell in 1823. The Gaussberg is a basalt mountain in Kaiser Wilhelm's Land, on the southern shore of the bay in which the *Gauss*, the vessel of the German Antarctic Expedition of 1901–3, reached its farthest south. Captain Scott proposes to establish his base near MacMurdo Sound, which was the winter quarters of the *Discovery*, and near which Sir Ernest Shackleton had his main base during the late expedition.

WE learn from a note in the *Engineer* for January 7 that dirigible airship companies are moving fast in Germany. A Parseval airship was ordered this month by the Munich Aëronautical Company, the share capital of which is to be increased to 400,000 marks. The airship is expected to be delivered on May 1, when regular aerial tours are to be commenced. An airship station is to be built in the Upper Bavarian tourists' territory, to which flights will be made from Munich. Another aëronautical company has been founded this month for exploiting the motor-driven airships according to the system of Herr Zorn, and for establishing airship lines. The municipality of Gräfrath has placed about sixty-eight acres of ground at the disposal of this company. Major Von Parseval has accepted a nomination as unsalaried lecturer on dirigible airships at the Charlottenburg High School, and has already given one lecture before the teaching staff.

THE next International Congress of Mining, Metallurgy, Applied Mechanics, and Practical Geology will be held at Düsseldorf in the last week of June next. The conference will be divided into four sections, dealing respectively with the subjects named in the title of the congress. The president of the mining section is Mr. Randebrock, director-general of the Gelsenkirchener Mining Company; of the metallurgical section, Mr. Springorum, director-general of the Hoesch Iron and Steel Works; of the applied mechanics section, Mr. C. Kiesselbach; and of the practical geology section, Mr. Schulz-Briesen. The general secretaries are Dr. Schrödter and Mr. Loewenstein. There will be two grades of membership of the congress: members, who are entitled to become patrons of the congress by payment of not less than 5*l.*, and members who pay a subscription of 1*l.* Any inquiries should be addressed to the committee of organisation of the congress, Jacobistrasse 3/5, Düsseldorf, Germany. Members of the Iron and Steel Institute resident in the United Kingdom who wish to attend the congress are requested to apply to the institute not later than February 26.

DURING last week the Liverpool Geological Society celebrated the jubilee of its first meeting. On Monday, January 10, the society entertained at dinner the Lord

Mayor and Lady Mayoress, and representatives of the University, of kindred societies in the city, and of the Yorkshire Geological Society and the North Staffordshire Field Club. The toast of the University elicited expressions of regret at the absence of a chair of geology in the University. The first meeting of the society having been held on January 11, 1860, an open meeting was held on the Tuesday of last week, and was largely attended. Mr. W. Hewitt, the president, was in the chair, and the minutes of the first meeting having been read, he remarked that that meeting was held in a room in the house of Mr. G. H. Morton, the first honorary secretary of the society. He also read a letter from Mr. H. Duckworth, the first president, congratulating the society and regretting that his age prevented his being present. Prof. J. W. Judd, C.B., F.R.S., an honorary member of the society, then delivered an address on "The Triumph of Evolution: a Retrospect of Fifty Years," remarking that the foundation of the society was nearly coincident with the appearance of Darwin's "Origin of Species." A very careful *résumé* of the address appeared in the Liverpool papers, and it is to be hoped that the address will later be printed *in extenso*.

THE first and second annual reports presented by the council of the National Museum of Wales to the Court of Governors are now available. The second report deals with the year ending September 30 last, and records satisfactory progress in the work of founding and establishing the museum. The report points out that Dr. W. E. Hoyle, the director of the museum, entered upon his official duties on March 1. In August an advertisement was issued requesting designs to be sent in for a building to cost 250,000*l.* when complete, and it is hoped it may be found possible to erect about one-third of it in the first instance. The sum of 2000*l.* is included in the estimates of the Chancellor of the Exchequer for the current financial year to defray the working expenses of the museum, and of this 500*l.* has been received. The trustees of the "Cardiff Fund" have handed over the sum of 26,796*l.* which had been collected as a contribution to the building fund in the event of the museum being located in Cardiff. A Bill, promoted by the Cardiff Corporation, is before Parliament empowering the Corporation to make over to the National Museum the collections contained in the Welsh Museum of Natural History, Arts and Antiquities, belonging to the municipality, together with the proceeds of a halfpenny rate, which at the present time would yield about 2000*l.* per annum, towards the maintenance of the museum. In March last the director of the museum visited northern Germany and Scandinavia to study museums and kindred institutions with the view of acquiring information which will be needed in organising the new institution, and a report on the visit is printed as an addendum.

THE *Journal of Conchology* for January contains a paper, by Mr. J. W. Vaughan, on the land and fresh-water molluscs of South Wales.

THE *Entomologist's Monthly Magazine* for January opens with a coloured plate of seven rare or otherwise interesting British insects, of which one is a wasp, while the remaining six are beetles. The wasp, *Odynerus herricki*, was first recorded as British on the evidence of a single specimen in Dorsetshire in 1878; a second example was subsequently taken in Purbeck, and a third near Wareham, but in 1908 the species was found in abundance near Swanage.

IN the report of the Madras Government Museum for 1908–9 it is announced that, at the time when the document was drafted, four volumes of Mr. Edgar Thurston's

encyclopædic work on the "Castes and Tribes of Southern India" were then ready, and that it was hoped the printing of the remaining volumes would be completed during the current financial year. The museum has received a number of additions during the year, among which may be mentioned a series of coins acquired by means of the Indian Treasure Trove Act.

THE value of the stereoscope in biological investigations forms the subject of an article, by Dr. W. Berndt, in *Naturwissenschaftliche Wochenschrift* of January 2. The instrument, it appears, has lately been used by Prof. F. E. Schulze, of the Berlin Zoological Institute, for the investigation of the structure and mode of action of the ultimate ramifications of the bronchial tubes, or broncheoli, in the lungs of mammals. Such objects have to be prepared in a special manner before being photographed for the stereoscope, but when this is done a stereogram is stated to afford an insight into the structure which cannot be obtained in any other way. Stereograms of an amoeba, of the broncheoli of a rat's lung, and of a section of the lung of an ostrich illustrate the paper.

WE are indebted to the author, Mr. J. W. Shoebottom, for a copy of his paper on the life-history of *Callidium violaceum*, reprinted from vol. iv., part iv., of the *Journal of Economic Biology*. In the year 1908 Mr. Shoebottom noticed insect-borings in some of the wooden fences near Berkhamsted, and subsequently ascertained that these were made by the larvæ of the beetle *Callidium violaceum*, a species which does not appear to have been observed in England as damaging timber since the time of the Rev. William Kirby. Mr. Shoebottom has worked out the life-history of this beetle, which attacks only coniferous timber—more especially larch—from which the bark has not been removed. The larvæ burrow between the bark and the wood, but subsequently tunnel into the latter, in which they pass the pupa-stage.

IN the January number of Witherby's *British Birds* further notes are given with regard to the flights of cross-bills which visited the British Islands in the second half of 1909. In Durham these birds were noticed in the last week of June, while at Woburn Abbey a flock was observed so late as December 24. As an appendix to these notes, Dr. C. B. Ticehurst refers to the circumstance that the crossing of the two halves of the beak in these birds is dimorphic, the upper half having its tip directed in some cases to the right and in others to the left side. In *Loxia curvirostra* the rights seem to be about equal in number to the lefts, but in *L. leucoptera* the lefts appear to be twice as numerous as the rights. Further specimens are, however, required before the existence of such a difference between the two species can be considered proven. In 1903 three examples of the black-winged pratincole (*Glareola melanoptera*) were shot in Kent, these being the first recorded British examples of the species. A fourth specimen was shot at Northallerton, Yorkshire, on August 17, 1909.

A DESCRIPTION of the lateral roots of *Amyelon radicans*, a Carboniferous type now accepted as part of a gymnospermous Cordaitan structure, forms the subject of a paper, by Mr. T. G. B. Osborn, in the *Annals of Botany* (vol. xxiii., No. 92) with respect to the branching of the root and the occurrence of a fungus permeating the cells of the cortex. The fungus mycelium is traceable in the outer cortex, but only forms dense tufts in the inner zone; the hyphæ are non-septate, ending sometimes in thick-walled vesicles. Proceeding from analogy with the root-tubercles

of Podocarpus, and having regard to the branching tendency of the lateral roots, the author arrives at the conclusion that the fungus was a mycorrhiza.

THE Government of India has issued two additional Forest Pamphlets (Nos. 10 and 11) dealing with Indian timbers, prepared by Mr. R. S. Troup, the Imperial forest economist. The first refers to *Lagerstroemia tomentosa*, a tree, yielding Burmese Leza wood, that grows in the forests of Burma with *Xylia dolabriformis*. It might be classed with American birch, with which, however, it could not compete on the European market. It is recommended for use in India for tea-boxes, and is under trial for railway sleepers, as also for conversion into match splints. The second pamphlet deals with *Carallia integerrima*, which yields a timber resembling European oak in the silver grain, but differing in its brittle nature. Locally it is used in construction and for agricultural implements, and has been favourably reported on for brush-backs.

A PAPER on the British pansies, contributed by Dr. E. Drabble to the Journal of the Royal Horticultural Society (vol. xxxv., part ii.), is brought to notice, not only for the observations which are recorded, but also because it represents a line of work which is desirable and likely to be fruitful in results, especially in the case of plants which are hybridised. The author has taken the species *Viola tricolor*, L., and traced out by comparison with authentic specimens, as also by growing plants through several generations, a series of forms—the elementary species of Jordan and Boreau—among British plants. As a conclusion, four classes of British pansies are demarcated, and it is suggested that the garden stock may have been produced from *Viola Lloydii*, *V. variata*, and (rather doubtfully) *V. polychroma* by crossing with *V. lutea*.

WHEN consideration is given to the great difference between the conditions in the Alps and in English gardens, it is a matter for surprise that so many Alpine plants can be grown successfully in our climate. The contrast is well brought out in an article published in the Journal of the Royal Horticultural Society (vol. xxxv., part ii.) by Mr. A. Clutton-Brock, who submits some arguments with respect to cultivation and treatment which cannot fail to interest the growers of alpine plants. Primarily, the author directs attention to the correct disposition of rocks and stones so that the roots may run underneath and obtain protection from drought. This is particularly necessary for *Dryas*, *Silene acaulis*, and *Polygala chamaebuxas*. Top-dressing is suggested for *Primula* and *Aster alpinus* to imitate the action of deposits left by the snow. Close planting is another recommendation, provided unequal competition between intermingling plants can be avoided. On this point the author gives details regarding suitable combinations of plants.

FROM the *Agricultural Journal of British East Africa* we learn that cotton growing is making steady and continuous progress at the coast, although the early difficulties were very numerous, and large sums of money had to be expended in educational work. There is still the prospect of trouble with insect pests, but it is stated that cotton growing is distinctly profitable to the native. In the same journal there is also a suggestive article on the prospects of the production of cane sugar; considerable quantities are at present imported, but there is every reason to believe that it could be produced locally and form the basis of a flourishing industry.

WE have received from the United States Department of Agriculture Bureau of Soils a bulletin, by Dr. Whitney, summarising the results of nearly 3000 manurial trials on cotton soils made during the past twenty-one years. The general conclusion is that complete fertilisers give the largest and, as a rule, the most profitable crop. The increase in yield due to mixtures of artificial manures was approximately an additive effect, an interesting result that deserves further examination. A report is also issued on the Volusia soils, which cover an area of more than ten million acres in southern New York, northern Pennsylvania, and north-eastern Ohio, and are commonly said to be "worn out," the farms in some localities having been abandoned. It is well illustrated and typical of the soil survey work carried out by the department. The soils suffer from lack of drainage, poor physical condition, and depletion of organic matter, conditions for which suitable remedies are suggested.

WE have received advance chapters of the annual report on the mineral production of Canada during the calendar years 1907 and 1908, dealing respectively with the production of coal, coke and peat, of natural gas and petroleum, and of iron and steel in the Dominion. These reports show a steady but not a great development in all these branches of mineral industry; the production of coal in the two years in question was respectively 10,511,426 and 10,886,311 tons, as against 9,762,601 tons in 1906, about one-eighth of this being made into coke; the production of peat was practically nil. The production of crude petroleum was 788,872 barrels (of 35 gallons) in 1907 and 527,987 barrels in 1908; the production of natural gas was also important. The production of pig iron is about stationary, being 651,962 tons in 1907 and 630,835 tons in 1908, about one-sixth in each case being smelted from native and the remainder from imported ores.

MR. R. A. STEWART MACALISTER, by permission of the committee of the Palestine Exploration Fund, for whom the materials were originally collected, contributes to the number of the *Journal of the Gypsy-lore Society* for October, 1909, the first of a series of papers on the language of the Nawar or Zutt, the nomad smiths of Palestine. The language is in its basis pure Romani, but it has assimilated many Arabic words, that is to say, not literary Arabic, but the colloquial dialect of Palestine. Some words are used without change, but a large number have become naturalised in Nuri, either indicating that they are survivals of a period when the tribe had newly arrived in Arabic-speaking lands, or that some terms have been modified with the object of secrecy to adapt them for use in the tribal argot. Mr. Macalister works out carefully the method of making these modifications. It is to be regretted that few of the stories so far published include any interesting or characteristic folk-lore material, most of the examples being incidents of everyday life or scraps of folk-tales dictated by the compiler.

AN excellent general account, by Dr. H. R. Mill, of the rainfall of the British Isles in 1909, in relation to other years, is contained in the *Times* of January 14, based upon a preliminary study of some 2000 of the returns of the British Rainfall Organisation, and on a comparison of 100 long-established records, distributed as uniformly as possible over the country, with their own averages for 1870-99. These latter values are given in tabular form, and the summary of the percentages shows considerable differences in various divisions; in Scotland, as a whole, the annual rainfall was practically normal; in Ireland and Wales there was a deficiency of 5 per cent., in the

north of England a considerable excess, while the amount over the British Isles generally was exactly the average. These results naturally agree in the main with those given by the Meteorological Office in its annual summary (*NATURE*, January 6). The best idea of the difference of the annual rainfall of the year from the average is shown by a neat little map. This exhibits conspicuous dry areas in the extreme south-west of Ireland, Wales, and England, and in the north-west of Scotland. The distinctly wet regions, with more than 10 per cent. above the average, surround the south and east of Great Britain; another area with more than 10 per cent. was in Lincoln, the north-east of Yorkshire, and Lancashire. The wettest months, generally speaking, were March, April, October, and December. November was unquestionably the driest month; over the whole of England the rainfall was only one-third of the normal. Dr. Mill remarks that the year probably acquired its undeserved reputation for wetness from the chilly gloom of some of the summer months, which both looked and felt far wetter than they were.

MESSRS. TEUBNER are issuing in pamphlet form some of the most important of the public addresses which have been delivered by distinguished German physicists during the last few years. Amongst them is one on electrons, given by Prof. W. Wien before the *Versammlung deutscher Naturforscher*, which has already reached a second edition. It deals in a clear and interesting way with the rise and progress of our knowledge of the properties of electrons, and explains the methods by means of which that knowledge has been acquired, without making a great demand on the reader's mathematical powers. Prof. Wien prefers the theory which makes an electron in motion take a spheroidal shape to that on which electrons are rigid spheres, and shows in his additions to the present edition that the evidence from the principle of relativity supports this view. A special difficulty of the electron theory is, in his opinion, that of explaining how an electron holds together under the enormous repulsive forces which the parts of it exert on each other.

THE *Journal de Physique* for December, 1909, contains a paper communicated to the *Société française de Physique* on November 19 by M. L. Houllevigue, in which the sizes of the particles shot off from a silver kathode in a vacuum tube are calculated. The method depends on the fact that when a vapour condenses on a surface colder than itself the drops form at definite points of the surface constant in number, and if evaporated and re-condensed form again at the same points. When a glass surface has been exposed to bombardment from the kathode rays, the author considers that the points at which condensation of a vapour occurs are those at which particles of the kathode have become attached to the glass. The number of these points, and therefore of the kathode particles, is proportional to the time of exposure to the bombardment, and may be counted directly under the microscope after mercury vapour has condensed on them. The thickness of a deposit may then be found by Fizeau's method after the film has been exposed to the vapour of iodine. From the volume of the deposit on any area and the number of particles calculated from the counting experiment, M. Houllevigue finds the volume of the particle shot off from a silver kathode to be about 7×10^{-13} cubic millimetres, that is, it consists of about 20 million molecules.

FOR several years the Scottish Provident Institution, Edinburgh, has issued, within the covers of a blotter, an excellent set of star-maps, by Mr. W. B. Blaikie, showing the constellations visible when facing north and south

month by month. The stars are represented by gilt asterisks on a dark blue background, upon which the names of the constellations are printed in black, so that when the charts are viewed at a suitable angle the stars are seen without the names, the result being very effective. With the 1910 issue (the thirteenth series), a chart of the heavens in two hemispheres is included showing the track of Halley's comet in 1909-10, and some notes upon the comet's orbit and spectacular appearance. The usual particulars of the positions of the sun, moon, and planets throughout the year are also given. The publication is excellently produced, and should continue its usefulness in promoting an intelligent interest in the aspects of the heavens and the movements of celestial bodies.

A VALUABLE paper on the testing of impulse water-wheels of the Pelton wheel type was presented by Mr. William Rankine Eckart at the Institution of Mechanical Engineers on January 7. This paper is of interest on account of the experiments described being the first of the kind on such a large scale. By means of the Pitot tube and other measuring devices the author has measured the nozzle discharge under different conditions, and so has determined the hydraulic efficiency of the generating plant, the capacity of each water-wheel amounting to about 3500 horse-power. The following table gives a summary of the more important results of the four tests made, and shows the distribution of the power as percentages of the power in the jet:—

Test number	1	2	3	4
Loss in bucket friction and eddies ...	23'0	23'2	27'7	29'2
Loss in residual velocity of discharge..	1'1	1'0	1'8	1'9
Other hydraulic losses... ..	1'5	1'6	1'1	0'8
Loss in friction and windage, generator and wheels	7'5	4'4	3'2	2'8
Loss in generator, iron and armature..	2'8	1'8	1'3	1'2
Delivered to switchboard	64'1	68'0	64'9	64'1

In the discussion on the hydraulic papers at the Institution of Mechanical Engineers on January 7, Dr. Unwin referred to the difficulties which Canadian engineers have to contend with in preventing stoppages from ice. Block ice is easily dealt with. With frazil ice, *i.e.* minute particles of ice suspended in and moving with the water, the difficulty is serious. We learn from a recent number of the *Canadian Engineer* that about forty water-wheels at and near Ottawa are now equipped with heating devices, which prevent frazil from stopping the wheels and clogging the gates and gate-mechanisms. The latest 3000-horse-power unit at the Ottawa and Hull Power and Manufacturing Company's Station has the chutes and gate chambers cored out, and there are pipe connections to the openings so that steam or hot water may be kept circulating through them when frazil is anticipated. The racks or screens are kept free from ice by electric motor-driven rakes, and at present none of these is heated. Mr. John Murphy recommends that the racks be submerged or otherwise protected from the atmosphere, when only a small amount of heat would be necessary to prevent ice clinging to them.

COMMENTING on the evidence offered at the inquiry into the cause of the disastrous fire at Messrs. Arding and Hobbs, Clapham Junction, the *Builder* for January 8 finds itself unable to agree with the architect's—Mr. Thorneycroft—opinions regarding his belief in the merits of steel as a structural material. Evidently he does not consider

reinforced concrete to be a practical substitute for steel. It is, of course, understood that there are difficulties in altering and enlarging old buildings which prevent the changing of the general nature of the construction. Other evidence showed that, had there been concrete floors, and if the steel-work had been encased in concrete, there would have been little to burn except the contents of the rooms. As it was, the girders were only protected by the matched lining, and the distortion of the steel brought the building down. However strongly one may disapprove such methods of construction, the fact remains that the Clapham Junction building conformed with the requirements of the law, and represented quite an ordinary risk. Under the new regulations of the County Council protected steel-frame or reinforced concrete buildings ought to cost no more than structures of brick and unprotected steel. The extreme undesirability of the latter type is the most important lesson of this fire.

ON account of its fundamental importance in atomic-weight determinations, numerous researches have been published during the last four years on the atomic weight of chlorine, in most of which the direct ratio H/Cl has been attempted by gas volumetric or gas density methods. The latest contribution to this subject is by Otto Scheuer, who, in the current number of the *Zeitschrift für physikalische Chemie*, finds the weight of a litre of hydrochloric acid to be 1.6394 under normal conditions. From this the figure 35.466 is deduced as the atomic weight of chlorine, differing from the 35.460 of Gray and Burt by about 1 part in 6000. The paper in the *Zeitschrift* gives full details of the experimental work, and also of the methods of reduction employed. A critical examination of the results of Gray and Burt is given at the end of the paper.

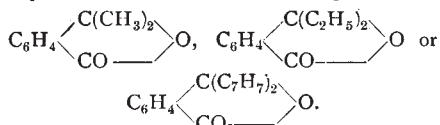
THE place of honour in the *Bulletin de la Société d'Encouragement pour l'Industrie nationale* for November, 1909, is given to a study, by MM. Pipereaut and Vila, on the manufacture of zinc sulphide and its use as a pigment. From a report by M. A. Livache, which precedes the memoir, it appears that a law has just been passed prohibiting entirely the use of white lead as a paint after the expiry of a period of five years, and that the authors have devised a satisfactory method of preparing zinc sulphide, as a substitute, by dissolving the oxide in caustic alkali and boiling the solution with sulphur, the first portion of which throws down the impurities (lead and other metals giving coloured sulphides), whilst the later additions precipitate the zinc sulphide in a pure form which (after drying at a red heat) is eminently suited for use as a paint.

THE monographs on photo-chemistry by Prof. Bancroft, which have been appearing in recent numbers of the *Journal of Physical Chemistry*, have been followed up by two experimental papers, one of which, by Mr. G. A. Perley, on solarisation, appears in the November number, and the other, by Mr. J. W. Wilkinson, on the phosphorescence of some inorganic salts, in the December number of 1909. The latter contains an interesting account of some luminous effects produced during the electrolytic preparation of insoluble metallic salts, and during slow oxidation, chlorination, &c. In a large range of cases it is shown that the colour of the light emitted is identical with that which is produced when the salt is made to phosphoresce by various methods, and the view is advanced that the phosphorescence is due to certain definite types of chemical change.

THE *Journal of Physical Chemistry* for November, 1909, contains a paper, by Mr. B. E. Curry, on the alloys of zinc with antimony, tin, cadmium, bismuth, and lead. Although the metal forms two layers with lead and with bismuth at low temperatures, the mutual solubility increases rapidly as the temperature is raised, the lead-zinc alloys becoming completely homogeneous at about 920° and the bismuth-zinc alloys at 820°. The formation of compounds was observed only in the alloys of zinc and antimony, which gave crystals of ZnSb and Zn_3Sb_2 , but solid solutions were obtained of zinc in tin (up to 7 per cent. Zn), in bismuth (up to 4 per cent. Zn), and in cadmium (up to 4 per cent. Zn), and of cadmium in zinc (up to 4 per cent. Cd); the zinc-antimony alloys also gave three series of solid solutions, resulting in a very complex equilibrium diagram.

THE *Journal of the College of Science, Tokyo*, of June 15, 1909, which has recently come to hand, contains a paper, by Y. Shibata, on the action of the Grignard reagent on *o*-phthalic esters. The *p*-phthalic esters have been shown by Ullmann and Schaeffer to resemble the succinic

esters in giving glycols of the type $\text{C}_6\text{H}_4 \begin{smallmatrix} \text{CR}_2\text{OH} \\ \text{CR}_2\text{OH} \end{smallmatrix}$, but the main product from the *o*-esters is a phthalide such as



The action may, however, proceed further, giving rise to the compounds



A remarkable compound of the second group is obtained by the action of phenyl magnesium bromide. It is formul-

lated as $\text{C}_6\text{H}_4 \begin{smallmatrix} \text{C}(\text{C}_6\text{H}_5)_2 \\ \text{C}(:\text{C}_6\text{H}_4) \end{smallmatrix} \text{O}$, but must be regarded as containing a trimethylene or "carone" ring in the group $-\text{C}=\text{C}_6\text{H}_4$.

MR. P. D. MALLOCH, of Perth, is publishing through Messrs. A. and C. Black a book on the "Life-history and Habits of the Salmon, Sea-trout, Trout, and other Fresh-water Fish." From his connection with the Tay Salmon Fisheries Co., the author has had unusual opportunities of studying the subject, and has been able to clear up many doubtful points by the marking of smolts and their recapture as grilse and salmon. The study of scales also forms a section of the book.

M. CH. DELAGRAVE, of Paris, has sent us a copy of "La Langue Internationale et la Science," which is published at the price of one franc. This volume is a French translation of a book reviewed in these columns on August 19 last (vol. lxxxi., p. 218), "Weltsprache und Wissenschaft. Gedanken über die Einführung der internationalen Hilfssprache in die Wissenschaft," by Profs. L. Couturat, O. Jespersen, R. Lorenz, W. Ostwald, and L. Pfaunder. The translation has been done by M. Boubier, of the University of Geneva.

THE issue of Willing's "Press Guide and Advertiser's Directory and Handbook" for 1910 (price 1s.) has reached us. It continues to be what its subtitle claims for it—a concise and comprehensive index to the Press of the United Kingdom. It provides information concerning all the newspapers, magazines, reviews, and other periodicals, including journals, proceedings, reports, and transactions of

learned societies. Lists of the principal colonial and foreign journals are also included.

THE 1910 issue of "The Science Year Book," edited by Major B. F. S. Baden-Powell, and published by Messrs. King, Sell and Olding, Ltd., at 5s. net, includes several new features. The volume contains a monthly astronomical ephemeris which should be of particular service to astronomers and other observers, many useful tables, star-maps for the four seasons, with key-charts showing the names of constellations visible, a brief summary of matters of scientific interest in 1909, a glossary of recently introduced scientific names and terms, a full list of learned societies with particulars of membership, and a short account of various prizes and awards for scientific research. A good portrait of Sir Archibald Geikie, K.C.B., forms a frontispiece to the volume, and there is a chart showing the track of Halley's comet during 1910. The remainder of the volume consists chiefly of a diary, with a page for each day, and having at the head columns for the insertion of maximum and minimum temperatures, barometric height, rainfall, and other results of meteorological observation. The volume provides observers with exactly the kind of tabular information frequently required; and, with the diary, it constitutes a year-book which merits a place upon the study tables of many men of science and the bookshelves of observatories.

OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A NEW COMET.—Telegrams from the Kiel Centralstelle announce the discovery of a new comet at Johannesburg on January 17. In the first it was stated that the comet was discovered by Mr. Drake, and was seen at and after sunrise. Its approximate position was given as five or ten degrees south-south-west of the sun, which it was approaching.

The second telegram gives the more exact position, at 21h. 21.5 m. January 16 (Johannesburg M.T.), as

$$\text{R.A.} = 19\text{h. } 50\text{m. } 28\text{s.}, \quad \delta = 25^\circ 9' \text{ S.},$$

and states that the daily motion is +16m. 32s. in R.A. and $-2^\circ 25'$ in N.P.D.

As this object is intensely bright as it was seen in sunshine, and is travelling northwards, we may expect a fine display after sunset during the present week.

HALLEY'S COMET.—A telegram from Messrs. Frost and Parkhurst, dated December 31, 1909, and published in No. 4381 of the *Astronomische Nachrichten*, states that the prismatic camera shows the light of Halley's comet to be now largely due to the third cyanogen band. This suggests that attempts to photograph the comet should now be made with quartz objectives or speculum reflectors. Both glass objectives and silver-on-glass mirrors absorb a large percentage of the ultra-violet radiations, and the difficulty of obtaining quartz lenses of large aperture may possibly be compensated for by the much greater transparency of quartz, as compared with glass, to the more refrangible rays.

The anomalous apparent brightening of the comet which occurred in November has not been continued, and until about the middle of March the distance between the comet and the earth will continuously increase; but it is thought that the development of the comet, as it approaches nearer to the sun, should be sufficient to make naked-eye observations possible by about the end of February.

This anomalous increase of the apparent brightness is described by the Rev. T. E. R. Phillips in a note appearing in No. 2, vol. lxx., of the *Monthly Notices*. He commenced observing, with a 12½-inch Calver reflector, on November 16, and observed the apparent brightness on ten nights between that date and December 8; from these observations he concludes that the apparent brightness of the comet was unquestionably greatest on November 22, when he was able to see it with the aperture stopped down to 3½ inches. The next night, under comparable atmo-